IN THE UNITED STATES DISTRICT COURT
FOR THE NORTHERN DISTRICT OF TEXAS
DALLAS DIVISION

NABORS DRILLING TECHNOLOGIES USA, INC.,	§	
	§	
Plaintiff,	§	
	§	Civil Action No. 3:20-cv-03126-M
v.	§	
	§	
HELMERICH & PAYNE INTERNATIONAL DRILLING CO., et al.,	§	
	§	
Defendants.	§	

CLAIM CONSTRUCTION MEMORANDUM OPINION AND ORDER

This Order addresses the claim construction disputes presented by Plaintiff and Counter-Defendant Nabors Drilling Technologies USA, Inc. ("Nabors") and Defendants and Counter-Claimants Helmerich & Payne International Drilling Co., Helmerich & Payne Technologies LLC, and Motive Drilling Technologies, Inc. (collectively, "H&P") in this case. Having considered the arguments and evidence presented by the parties at the claim construction hearing, the Court issues this Order addressing claim construction disputes as to the patents asserted by H&P.[1]

I. BACKGROUND

H&P asserts that Nabors infringes certain claims of four asserted patents, all assigned to Defendant Motive Drilling Technologies, Inc.: U.S. Patent No. 8,210,283 ("the '283 Patent"), U.S. Patent No. 9,865,022 ("the '022 Patent"), U.S. Patent No. 10,726,506 ("the '506 Patent"), and U.S. Patent No. 10,208,580 ("the '580 Patent") (collectively, the "Motive asserted patents").

[1] The Court previously issued a separate order addressing the claim construction disputes covering the patents asserted by Nabors. *See* ECF No. 126.

A. The ’283 patent: “System and method for surface steerable drilling”

The ’283 patent recites “a system and method for surface steerable drilling.” ’283 patent, at 2:18–19. The ’283 patent explains how drilling a borehole for extracting minerals is complicated, and how errors in drilling can add to the cost of an operation and, in some cases, permanently lower a well’s output. *Id.* at 1:12–22, 3:10–20. To combat this, the ’283 patent describes calculating and evaluating solutions for returning a drill bit in a borehole back to a planned path when it strays off course, by comparing the estimated position of the drill bit to its desired position based on a predetermined planned path, and taking into account various factors—such as financial cost, reliability, time, or other values—impacting the choice of solution. *E.g.*, *id.* at 18:15–50.

H&P asserts claims 15–17 and 22 of the ’283 patent. Claim 15 is an independent claim, from which claims 16, 17, and 22 all depend. Claim 15 recites:

> A method for drilling a borehole comprising:
>
> > receiving, by a surface steerable system, feedback information from a drilling rig engaged in using a drill bit to drill a borehole in a formation;
> >
> > calculating, by the surface steerable system, an estimated position of the drill bit in the formation based on the feedback information;
> >
> > comparing, by the surface steerable system, the estimated position of the drill bit to a desired position of the drill bit along a planned path of the borehole;
> >
> > calculating, by the surface steerable system, a plurality of solutions if the comparison indicates that the estimated position is outside a defined margin of error relative to the desired position, wherein each of the plurality of solutions defines a path from the estimated position to the planned path;
> >
> > calculating, by the surface steerable system, a cost of each of the plurality of solutions;
> >
> > selecting, by the surface steerable system, a first solution from the plurality of solutions based at least partly on the cost of the first solution;
> >
> > producing, by the surface steerable system, control information representing the first solution; and

> outputting, by the surface steerable system, the control information for the drilling rig; and drilling, by the drilling rig, at least a portion of the borehole based on the control information.

'283 patent, cl. 15.

B. The '022 and '506 patents

The '022 patent is entitled "System and method for defining a drilling path based on cost." The '506 patent is a continuation of the '022 patent and shares the same specification, and is entitled "System for drilling a selected convergence path."

As used in the specification of the '022 and '506 patents, a "convergence path" is a path from the current or future location of a bottom hole assembly to a predefined "target path" for the borehole in a drilling operation. '022 patent, at 2:54–57; '506 patent, at 2:50–54. The '022 and '506 patents describe systems and methods for selecting a convergence path among a plurality of potential paths. For example, "if the borehole is being drilled and the [bottom home assembly ("BHA")] is off of the target path, a cost comparison may be used to determine the best convergence path in terms of cost for returning the BHA to the target path when there are an infinite number of paths from which to choose." '022 patent, at 3:43–50; '506 patent, at 3:42–47. The specification describes different types of costs that may be assessed in evaluating competing convergence paths, such as a distance cost, a sliding cost, a curvature cost, a time cost, a dogleg cost, a deviation cost, and/or a launch penalty cost. '022 patent, at 3:36–42; '506 patent, at 3:32–38. Depending on the parameter(s) being evaluated, the "best" path optimizing that particular parameter may be selected. *See* '022 patent, at 5:34–50; '506 patent, at 5:29–45.

H&P asserts claims 1, 5–6, 10, 13, 15–18, and 22 of the '022 patent. Claims 1 and 13 are independent claims; claims 5–6 and 10 depend on claim 1, and claims 15–18 and 22 depend on claim 13. Claim 1 of the '022 patent recites:

> A method for drilling a well using one of a plurality of convergence paths that may be drilled by a bottom hole assembly (BHA) comprising:

> identifying, by a computer system, a plurality of geometric convergence paths, wherein each of the geometric convergence paths provides a convergence solution from a defined bottom hole assembly (BHA) location to a target drilling path of a well plan;
>
> calculating, by the computer system, an offset distance for drilling by the BHA each of the geometric convergence paths connecting the BHA location to the target drilling path;
>
> determining, by the computer system, a drill path curvature associated with drilling each of the geometric convergence paths by the BHA;
>
> determining, by the computer system, a time required for drilling each of the geometric convergence paths by the BHA;
>
> determining, by the computer system, an optimal geometric convergence path of the plurality of geometric convergence paths responsive to the offset distance for drilling each of the geometric convergence paths, the drill path curvature associated with each of the geometric convergence paths and the time required for drilling each of the geometric convergence paths;
>
> providing the determined optimal geometric convergence path to a controller device of a drilling rig;
>
> automatically controlling, by the controller device, the drilling rig, to drill in accordance with the determined optimal geometric convergence path.

’022 patent, cl. 1.

H&P asserts claims 1–6 and 9–10 of the ’506 patent. Claim 1 is an independent claim, on which claims 2–6 and 9–10 all depend. Claim 1 of the ’506 patent recites:

> A drilling system comprising:
>
> a drilling system having a drill string and a bottom hole assembly at one end of the drill string;
>
> a computer system coupled to said drilling system, said computer system comprising at least one processor and at least one memory unit, wherein
>
> the at least one memory unit is coupled to the at least one processor and configured to store a plurality of instructions executable by the at least one processor, the instructions including instructions for: (i) identifying a plurality of convergence paths, wherein each of the convergence paths provides a convergence solution from a bottom hole assembly (BHA) location to a target path for a bore hole; (ii) calculating an offset distance for drilling by the BHA each of the convergence paths to the target path; (iii) identifying a drill path curvature of each convergence path; (iv) identifying an amount of time needed to drill each convergence path; (v) selecting one of the convergence paths as an optimal convergence path based on at least one of the offset distance, the drill

> path curvature, and the amount of time needed to drill the convergence paths; and (vi) controlling the drilling system to drill in accordance with the selected convergence path.

'506 patent, cl. 1.

C. The '580 patent: "System and method for detection of slide and rotation modes"

The '580 patent describes a system and method for surface steerable drilling. The specification of the '580 patent describes two modes of drilling known in the prior art: rotating and sliding. '580 patent, at 5:48–56. Rotating, also known as "rotary drilling," is used to drill along a straight path, and involves rotating the entire drillstring using a topdrive or rotary table. *Id.* Sliding, also known as "steering," is used to control well direction by using a downhole mud motor with an adjustable bent housing. *Id.*; *see also id.* at 29:50–30:4. Hydraulic power is used to drive the downhole motor and bit, which causes an intentional steering of the well bore in the direction the bend angle is held. *Id.* at 29:50–30:4.

The specification of the '580 patent explains that there are challenges to accurately determining and detecting the downhole location of slides. *Id.* at 31:11–22. In response, the '580 patent purports to disclose embodiments "to refine and make more accurate determinations of when and where sliding is occurring and the net effect of sliding on the borehole geometry," by identifying, evaluating, and tracking certain variables, referred to in the '580 patent as "slide conditions." *Id.* at 31:50–60. Such conditions include, for example, circulation, whether the BHA is stationary, and whether the drill string is "on bottom," *i.e.*, "at the lowest point in which the drill string has already drilled and the wellbore exists." *Id.* at 31:50–34:47.

H&P asserts claims 1, 4, 6–7, 11, 16–17, and 20–22 of the '580 patent. Claims 1, 11, and 21 are independent claims; claims 4 and 6–7 depend on claim 1, claims 16–17 and 20 depend on claim 11, and claim 22 depends on claim 21. Claim 1 of the '580 patent recites:

An apparatus, comprising:

> a slide estimator of a surface steerable system of a drilling rig for generating information relating to slides responsive to externally monitored data;
>
> wherein the slide estimator can detect whether a borehole assembly (BHA) connected to the drilling rig is in a slide mode of operation or a rotary mode of operation responsive to the externally monitored data;
>
> wherein the slide estimator detects a slide mode responsive to detection of a flow rate of drilling mud, a stationary BHA and an on bottom condition of the BHA; and
>
> wherein the detection of the flow rate of drilling mud is determined by detection of a standpipe pressure exceeding a standpipe pressure circulation threshold.

'580 patent, cl. 1.

II. LEGAL STANDARD

A. General Principles of Claim Construction

The construction of disputed claims is a question of law for the court. *Markman v. Westview Instruments, Inc.*, 52 F.3d 967, 971–72 (Fed. Cir. 1995), *aff'd*, 517 U.S. 370 (1996). "Ultimately, the interpretation to be given a term can only be determined and confirmed with a full understanding of what the inventors actually invented and intended to envelop with the claim." *Phillips v. AWH Corp.*, 415 F.3d 1303, 1316 (Fed. Cir. 2005) (en banc) (citation omitted). Accordingly, a proper construction "stays true to the claim language and most naturally aligns with the patent's description of the invention." *Id.* (citation omitted).

"It is a 'bedrock principle' of patent law that 'the claims of a patent define the invention to which the patentee is entitled the right to exclude.'" *Phillips*, 415 F.3d at 1312 (quoting *Innova/Pure Water, Inc. v. Safari Water Filtration Sys., Inc.*, 381 F.3d 1111, 1115 (Fed. Cir. 2004)). Courts first "look to the words of the claims themselves . . . to define the scope of the patented invention." *Vitronics Corp. v. Conceptronic, Inc.*, 90 F.3d 1576, 1582 (Fed. Cir. 1996) (citation omitted). The claim terms are "generally given their ordinary and customary meaning," but "a patentee may choose to be his own lexicographer and use terms in a manner other than

their ordinary meaning, as long as the special definition of the term is clearly stated in the patent specification or file history." *Id.* (citation omitted). The "ordinary and customary meaning" of the terms in a claim is "the meaning that the term[s] would have to a person of ordinary skill in the art in question at the time of the invention." *Phillips*, 415 F.3d at 1313.

When the meaning of a term to a person of ordinary skill in the art is not apparent, a court is required to consult other sources, including "the words of the claims themselves, the remainder of the specification, the prosecution history, extrinsic evidence concerning relevant scientific principles, the meaning of technical terms, and the state of the art." *Id.* (citation omitted). A court must consider the context in which the term is used in an asserted claim or related claims in the patent, being mindful that "the person of ordinary skill in the art is deemed to read the claim term not only in the context of the particular claim in which the disputed term appears, but in the context of the entire patent, including the specification." *Id.* The specification is "always highly relevant to the claim construction analysis" and is "the single best guide to the meaning of a disputed term." *Id.* at 1315 (quoting *Vitronics*, 90 F.3d at 1582). For example, should the specification reveal that a claim term has been given a special definition by the patentee that is different from the ordinary meaning of the term, the inventor's lexicography is controlling. *Id.* at 1316. Furthermore, if the specification reveals an intentional disclaimer or disavowal of claim scope by the patentee, the claim scope dictated by the specification is controlling. *Id.*

Finally, in construing claims, a court may consult extrinsic evidence, including "expert and inventor testimony, dictionaries, and learned treatises." *Phillips*, 415 F.3d at 1317 (citing *Markman*, 52 F.3d at 980). Technical dictionaries may assist a court in "'better understand[ing] the underlying technology' and the way in which one of skill in the art might use the claim terms." *Id.* at 1318 (quoting *Vitronics*, 90 F.3d at 1584 n.6). Expert testimony may also be

helpful to "provide background on the technology at issue, to explain how an invention works, to ensure that the court's understanding of the technical aspects of the patent is consistent with that of a person of skill in the art, or to establish that a particular term in the patent or the prior art has a particular meaning in the pertinent field." *Id.* (citation omitted).

Although extrinsic evidence may "shed useful light on the relevant art," it is considered "less significant than the intrinsic record." *Id.* at 1317 (quoting *C.R. Bard, Inc. v. U.S. Surgical Corp.*, 388 F.3d 858, 862 (Fed. Cir. 2004)). More simply, "extrinsic evidence may be useful to the court, but it is unlikely to result in a reliable interpretation of patent claim scope unless considered in the context of the intrinsic evidence." *Id.* at 1319. Accordingly, "a court should discount any expert testimony 'that is clearly at odds with the claim construction mandated by the claims themselves, the written description, and the prosecution history, in other words, with the written record of the patent.'" *Id.* at 1318 (quoting *Key Pharms. v. Hercon Labs. Corp.*, 161 F.3d 709, 716 (Fed. Cir. 1998)).

B. Indefiniteness

Title 35, § 112(b) of the United States Code requires that a patent specification shall "conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the inventor or a joint inventor regards as the invention." The Supreme Court has held this definiteness provision "to require that a patent's claims, viewed in light of the specification and prosecution history, inform those skilled in the art about the scope of the invention with reasonable certainty." *Nautilus, Inc. v. Biosig Instruments, Inc.*, 572 U.S. 898, 910 (2014). "The claims, when read in light of the specification and the prosecution history, must provide objective boundaries for those of skill in the art." *Interval Licensing LLC v. AOL, Inc.*, 766 F.3d 1364, 1371 (Fed. Cir. 2014). If a claim does not satisfy these requirements, it is invalid as indefinite under § 112. *Nautilus*, 572 U.S. at 901. "[I]ndefiniteness is a question of

law and in effect part of claim construction." *ePlus, Inc. v. Lawson Software, Inc.*, 700 F.3d 509, 517 (Fed. Cir. 2012).

III. CONSTRUCTION OF DISPUTED TERMS

The parties present fourteen disputed terms for resolution, including multiple terms that Nabors contends are indefinite under 35 U.S.C. § 112 ¶ 2. In addition, the parties group certain related terms in their briefing and address them collectively. The Court will first address terms for which Nabors has raised an indefiniteness challenge and, where appropriate, will address the terms collectively, according to the parties' grouping.

A. Indefiniteness Challenges

1. "Drilling" and "Controlling" terms

Disputed Term	H&P's Proposed Construction	Nabors's Proposed Construction	The Court's Construction
"drilling, by the drilling rig, at least a portion of the borehole based on the control information." • '283 patent, cl. 15	Ordinary meaning	Indefinite (35 U.S.C. § 112, ¶ 2); alternatively, the driller controls the drilling rig to drill a portion of the borehole based on the costs of the plurality of solutions.	Ordinary meaning
"controlling the drilling system to drill in accordance with the selected convergence path." • '506 patent: cl. 1	Ordinary meaning	Indefinite (35 U.S.C. § 112, ¶ 2); alternatively, the driller controls the drilling rig to drill a portion of the borehole based upon the selected convergence path.	Ordinary meaning
"controlling the operation of the drilling rig responsive to the detected slide mode or rotary mode of operation" • '580 patent, cls. 11, 21	Ordinary meaning	Indefinite (35 U.S.C. § 112, ¶ 2); alternatively, the driller controls the drilling rig to drill based upon the detected slide mode or rotary mode of operation of drilling.	Ordinary meaning

a. The Parties' Positions

Nabors challenges terms that use "drilling" and "controlling" language in the '283, '506, and '580 patents as indefinite under § 112, on the grounds that unless these terms are construed as being limited to manual drilling and manual control, the claims are indefinite because each covers both automatic and manual drilling. Nabors contends that a claim covering multiple methods which produce substantially different results is indefinite under *Dow Chemical Co. v. Nova Chemicals Corp. (Canada)*, 803 F.3d 620, 634 (Fed. Cir. 2015).

For support, Nabors points to amendments proposed by the examiner—and agreed to by the patentee—during the prosecution history of the '022 patent, in which the word "automatically" was added to claims covering "controlling" and "drilling." *E.g.*, ECF No. 91-3, at 233 (proposing amending "controlling, by the controller, at least a portion of the drilling rig" to "automatically controlling, by the controller device, the drilling rig"); *id.* at 241 ("Applicants agreed to amend claims as presented in the . . . Examiner's Amendment."). Nabors contends amendment was necessary to overcome a rejection based on 35 U.S.C. § 101, because otherwise, the claims would be impermissibly directed to merely outputting instructions to be implemented by a human operator. Because the '022 patent involves some of the same inventors as the '283, '506, and '580 patents, and is also directed to controlling or drilling a rig, Nabors argues that H&P's acquiescence to the examiner's proposed amendments proves that the claims disputed here are limited to manual drilling, because the claims lack the "automatically" language. Moreover, Nabors argues that unless the disputed claims are limited to manual drilling, they are directed towards an abstract idea, and are unpatentable under 35 U.S.C. § 101.

H&P responds that these claims from the '283, '506, and '580 patents are not indefinite because the claim language, read in light of the specification, informs a POSITA about the scope of the claimed invention with reasonable certainty. For support, H&P points to the declaration of

its expert, Dr. Hilbert. *See* ECF No. 90, at App. 0024 ("Hilbert Dec.") ¶¶ 62–69, 81–88, 122–29. H&P also points out that Nabors provides no expert testimony for its contention that the disputed terms are indefinite, despite the fact that under *Nautilus*, the indefiniteness inquiry is rooted in whether a POSITA would understand the scope of the claim with relative certainty. Finally, H&P argues that Nabors misrepresents the prosecution history of the '022 patent, which H&P further contends is irrelevant as to the '283 and '580 patents, because they are unrelated to the '022 patent.

b. The Court's Construction

This dispute presents two issues: first, whether the claims including the challenged "drilling" and "controlling" terms inform those skilled in the art about the scope of the invention with reasonable certainty, so as to not be indefinite; and second, if not indefinite, whether the relevant claim language and specification require that each claim be construed to be limited to manual drilling.

Regarding the first dispute, the Court concludes that the "drilling/controlling" terms disputed here are not indefinite. As an initial matter, the Court is not persuaded that the Federal Circuit's decision in *Dow* mandates, as Nabors urges, that a claim covering multiple methods leading to substantially different results necessarily means that a claim is indefinite as a matter of law. In *Dow*, the Federal Circuit acknowledged that "the patent and prosecution history must disclose a single known approach or establish that, where multiple known approaches exist, a person having ordinary skill in the art would know which approach to select." *Dow*, 803 F.3d at 630. This is "particularly" significant "when different approaches to measurement are involved." *Id.* The relevant claim in *Dow* concerned measuring the maximum "slope of strain hardening coefficient," to determine whether the claim limitation of a coefficient "greater than or equal to 1.3" was met. *Id.* at 631–32.

In *Dow*, as observed the Federal Circuit, evidence was presented at trial indicating at least four different methods for measuring the maximum slope existed, each of which could produce different results, and the choice of method could thus affect whether a given product infringed. *Id.* at 633–34. Because neither the claim, specification, nor the prosecution history provided any guidance as to what method should be used, the Federal Circuit concluded that the claim was indefinite because one skilled in the art could not know with reasonable certainty the scope of the invention claimed. *Id.* at 634–35. Moreover, the Federal Circuit has subsequently clarified *Dow* and explained that the mere fact that different methods for measuring a claim parameter exist does not by itself render a claim indefinite; instead, the relevant inquiry is "whether the differing methodologies lead to materially different results in defining the boundaries of the claim." *Ball Metal Beverage Container Corp. v. Crown Packaging Tech., Inc.*, 838 F. App'x 538, 542 (Fed. Cir. 2020).

The claims of the '283, '506, and '580 patents challenged here do not involve taking a measurement, let alone multiple approaches for taking a measurement. Nor is there anything in the language of the claims or the specifications that suggest that using one method over another—for example, automatic drilling over manual—will affect the infringement inquiry as it did in *Dow*, *i.e.*, such that a POSITA would be unable to discern the boundaries of the claim. Put differently, Nabors does not explain how the choice of manual or automatic drilling would affect whether a challenged product would infringe each respective claim.

Moreover, the relevant claim language and specifications at issue in this dispute confer sufficient information such that a POSITA would know the scope of the claimed invention with reasonable certainty. *See, e.g.*, Hilbert Dec. ¶¶ 62–69, 81–88, 122–29. The specifications of the '283 and '580 patents recite both manual and automatic drilling, and explain aspects of the

drilling operation that may be implemented automatically. *E.g.*, '283 patent, at 22:25–36 ("[D]ecisions may be automated or may require input or approval by the drilling engineer 302, geologist 304, or other individuals. . . . In some embodiments, the surface steerable system 201 may automatically implement its calculated solution. Parameters may be set for such automatic implementation measures to ensure that drastic deviations from the original well plan do not occur automatically while allowing the automatic implementation of more minor measures."); '580 patent, at 23:22–37 (same). The '506 patent likewise describes various systems that would indicate to a POSITA the scope of the disputed claim language, "controlling the drilling system to drill in accordance with the selected convergence path." For example, the specification of the '506 patent describes an example "control system 242" in Figure 2A for controlling the drilling rig, and explains that once a convergence path is selected (for example, in steps 314 and 316 of Figure 3), "the output may be used to provide drilling instructions for directing the BHA back to the target path." *See* '506 patent, 6:50–56. The '506 patent also specifically references the control system described in the '283 patent, *id.* at 6:56–60, which describes various control systems that may be implicated in drilling operations. *E.g.*, '283 patent, at 6:13–21 (describing control systems 208, 210, and 212, which "may be used to monitor and change drilling rig settings . . . change the flow rate of drilling mud, and perform other operations."). Nabors does not show that a POSITA would not understand the scope of the challenged claim terms in light of these disclosures.

The Court declines to adopt Nabors's proposed alternative constructions, each of which require manual drilling by adding the limitation that "the driller controls the drilling rig to drill." Neither the relevant claim language nor the specifications of the '283, '580, and '506 patents limit the drilling to manual drilling. *E.g.*, '283 patent, at 22:25–36; '580 patent, at 23:22–37.

Moreover, the prosecution history of the ’022 patent—including the patentee’s decision to add the word “automatically” to certain claims—has no bearing on construction of claims in the ’283 and ’580 patents, which are not in the same family as the ’022 patent. As to the ’506 patent, which is a continuation of the ’022 patent, the fact that the patentee intentionally added the word “automatically” in claims in the ’022 patent indicates that the patentee knew how to express when the drilling should be limited to automatic or manual drilling, and chose not to include any such restriction in the ’506 patent.

Finally, the Court declines Nabors’s invitation to adopt a “saving” construction for these claims in anticipation of a § 101 challenge. The Court is obliged to construe the claims according to the claim language, specification, and extrinsic evidence; to the extent Nabors challenges the patentability of the subject matter under § 101, it can raise that challenge at summary judgment. At this juncture, the Court is unconvinced on the merits. Review of the relevant prosecution history of the ’022 patent reveals that the § 101 rejection appears to have been based on the examiner’s assessment that the claims were directed to “determining an optimal convergence path that may be drilled,” which corresponded to an abstract idea such as mathematical relationships or formulas, and not a rejection simply because the claim covered a manual driller. ECF No. 91-3, at 144–45. In responding to the § 101 rejection, the patentee did not contend that limiting the invention to automatic drilling resolved the examiner’s concerns; instead, the patentee argued that the examiner’s rejection did not sufficiently analyze the claim limitations under Step 2 of the § 101 inquiry. *Id.* at 164–71.

Because the Court finds no support for Nabors’s proposed construction, the Court construes each term to have its plain and ordinary meaning.

2. ’506 patent, claim 2: “identifies a plurality of convergence paths responsive to the drill plan information”

Disputed Term	H&P’s Proposed Construction	Nabors’s Proposed Construction	The Court’s Construction
“identifies a plurality of convergence paths responsive to the drill plan information” • ’506 patent, cl. 2	Ordinary meaning	Indefinite (35 U.S.C. § 112, ¶ 2).	Ordinary meaning

a. The Parties’ Positions

Nabors argues that claim 2 of the ’506 patent improperly combines an apparatus claim and a method claim into a single hybrid claim, which renders the claim indefinite under *Microprocessor Enhancement Corp. v. Texas Instruments Inc.*, 520 F.3d 1367 (Fed. Cir. 2008), and *MasterMine Software, Inc. v. Microsoft Corp.*, 874 F.3d 1307 (Fed. Cir. 2017). Specifically, Nabors contends that the active language in claim 2—describing how the processor “receives” drill plan information and “identifies” responsive convergence paths—adds an element that requires use of the apparatus described in system claim 1. H&P responds that this challenged language does not describe additional method steps, but rather describes additional capabilities of the claimed processor, and is thus not indefinite.

b. The Court’s Construction

The Court concludes that dependent claim 2 of the ’506 patent is not indefinite. Claim 2 recites the following:

> The drilling system according to claim 1, wherein the processor of the computer system receives drill plan information relating to a well plan; and identifies the plurality of convergence paths responsive to the drill plan information.

’506 patent, cl. 2.

“A single patent may include claims directed to one or more of the classes of patentable subject matter, but no single claim may cover more than one subject matter class.” *Microprocessor Enhancement*, 520 F.3d at 1374. Claims covering more than one subject class

are indefinite because "it is unclear whether infringement . . . occurs when one creates [an infringing] system, or whether infringement occurs when the user actually uses [the system in an infringing manner]." *UltimatePointer, L.L.C. v. Nintendo Co.*, 816 F.3d 816, 826 (Fed. Cir. 2016) (alterations in original) (quoting *IPXL Holdings, LLC v. Amazon.com, Inc.*, 430 F.3d 1377, 1384 (Fed. Cir. 2005)).

Here, the functional language at issue in dependent claim 2—"receives" and "identifies"—is clearly tied to the capabilities of the system described in independent claim 1, and claim 1 recites sufficient structure for those capabilities. Specifically, the drilling system described in claim 1 contains a processor and at least one memory unit, which in conjunction are capable of, *inter alia*, identifying a plurality of convergence paths, wherein "each of the convergence paths provides a convergence solution from a bottom hole assembly (BHA) location to a target path for a bore hold." '506 patent, cl. 1. Claim 2 describes additional capabilities of the processor, namely that the processor can receive drill plan information relating to a well plan and identify the plurality of convergence paths responsive to the drill plan information. *Id.* at cl. 2. The specification describes "drill plan information" and convergence paths with sufficient detail such that a POSITA would understand how to identify the plurality of convergence paths responsive to the drill plan information. *E.g.*, *id.* at 2:50–53, 5:46–56, fig.1; *see also* Hilbert Dec. ¶ 94. In addition, there is nothing in the claim language or the specification indicating that the "receives" and "identifies" steps in claim 2 occur when the user actually uses the system in an infringing manner. *Cf. Ultimate Pointer*, 816 F.3d at 826.

Accordingly, claim 2 is not indefinite for covering more than one subject matter class. The Court construes "identifies a plurality of convergence paths responsive to the drill plan information" to have its plain and ordinary meaning.

3. "Detection of Flow Rate" terms

Disputed Term	H&P's Proposed Construction	Nabors's Proposed Construction	The Court's Construction
"wherein the detection of the flow rate of drilling mud is determined by detection of a standpipe pressure exceeding a standpipe pressure circulation threshold" • '580 patent, claim 1	Ordinary meaning	Indefinite (35 U.S.C. § 112, ¶ 2); alternately, the flow rate of drilling mud is calculated by the standpipe pressure measurement exceeding a standpipe pressure threshold value.	Ordinary meaning
"wherein the step of detecting the flow rate further comprises determining whether a standpipe pressure exceeds a standpipe pressure circulation threshold" • '580 patent, claim 11	Ordinary meaning	Indefinite (35 U.S.C. § 112, ¶ 2); alternately, the flow rate of drilling mud is calculated by the standpipe pressure measurement exceeding a standpipe pressure threshold value.	Ordinary meaning
"wherein the step of detecting the flow rate of drilling mud further comprises determining if the flow rate of the drilling mud exceeds a predetermined flow circulation threshold" • '580 patent, claim 21	Ordinary meaning	Indefinite (35 U.S.C. § 112, ¶ 2); alternately, the flow rate of drilling mud is calculated by the standpipe pressure measurement exceeding a standpipe pressure threshold value.	Ordinary meaning

a. The Parties' Positions

Nabors argues that claims 1, 11, and 21 of the '580 patent are indefinite because each of these claims require "detection of the flow rate" (claim 1) or "detecting the flow rate" (claims 11 and 21). Nabors contends that this language requires calculation or determination of the actual rate at which the drilling mud is flowing—*i.e.*, gallons per minute—which according to Nabors, is impossible to achieve under the constraints dictated by the claim language, namely, by observing whether the "standpipe pressure exceeding a standpipe pressure circulation threshold" (claims 1 and 11) or the "flow rate of the drilling mud exceeds a predetermined flow circulation threshold" (claim 21). Accordingly, Nabors contends that since the flow rate cannot be

determined according to the patent language, the claims are indefinite "[b]ecause the patent claims cannot be practiced as expressly written." ECF No. 91, at 22.

H&P responds that the plain language of these claims does not require calculation of a numerical flow rate; instead, each respective claim defines detecting a flow rate to mean evaluating whether a certain variable—the standpipe pressure or flow rate, depending on the claim—exceeds a certain threshold. When considering these disputed terms in the context of the claims and the specification, H&P contends that the "detection . . . of flow rate" terms refer not to calculating a specific numeric rate of mud flow but rather to detecting a condition of drilling mud circulation, including a binary determination of "flow" versus "no flow." H&P's expert, Dr. Hilbert, further opines that a POSITA would have reasonable certainty as to the scope of the "detecting the flow rate" of drilling mud in claims 1, 11, and 12. Hilbert Dec. ¶¶ 112, 118–19. Finally, H&P points out that Nabors provides no expert opinion to support its position that claim 21 is indefinite, and thus has not met its burden under *Nautilus.*

b. The Court's Construction

Claims 1, 11, and 21 of the '580 patent are not indefinite. In context, the "flow rate" language does not require a numerical calculation of the exact rate by which the drilling mud is flowing; instead, the claims reveal that the patentee chose to explain what detecting flow rate means in the context of each particular claim. For example, claim 11 describes a step of "detecting" whether a borehole assembly is in slide mode or rotary mode, wherein the detecting step further comprises "detecting a flow rate of a drilling mud," which is then further defined by the patentee as being comprised of determining whether a standpipe pressure exceeds a certain circulation threshold:

> A method for detecting slide modes and rotary modes of a borehole assembly connected to a drilling rig, comprising:

> . . .
>
> detecting within a slide estimator . . . whether a borehole assembly (BHA) connected to the drilling rig is in a slide mode of operation or a rotary mode of operation responsive to the monitored at least one well sensor parameter;
>
> . . .
>
> wherein the step of detecting further comprises detecting a flow rate of a drilling mud, . . . and
>
> wherein the step of detecting the flow rate further comprises determining whether a standpipe pressure exceeds a standpipe pressure circulation threshold.

'580 patent, cl. 11 (emphasis added).

In this way, the language of claim 11 explains what "detecting the flow rate" means in the context of claim 11; an express calculation of the flow rate in terms of gallons per minute or some other unit of measurement is neither claimed nor required. *See Markman*, 52 F.3d at 980 ("[A] patentee is free to be his own lexicographer."). Claims 1 and 21 of the '580 patent similarly specify what detection of the "flow rate" comprises; neither require express calculation of a numerical flow rate.

This interpretation is supported by the specification, which describes how evaluation of flow rate or standpipe pressure is used to deduce circulation conditions necessary for proper drilling operation with the mud motor. *Id.* at 32:26–28. The specification states that flow rate can be evaluated by various methods, including digital flow rate meters and "the combination of either flow or nominal standpipe pressure." In describing these methods, the focus is not on determining the exact flow rate, but instead, considering whether a certain threshold, indicative of whether circulation is occurring, is met. *E.g.*, *id.* at 32:2–10 (explaining that "a zero" of "adjustable constant flowCirculationThreshold . . . should suffice to indicate no flow . . . because a nonzero case is evidence the mud pumps are running, which is usually sufficient evidence of circulation flow"); *id.* at 32:21–25 ("[A] [standpipe pressure] range of 10-100 psi is usually a

sufficiently low enough threshold to conservatively deduce pumps are not actively circulating."). The specification thus confirms that a binary determination of flow rate—whether there is flow or no flow, to the extent it informs on drilling mud circulation—suffices to satisfy these claim elements. Nabors points to nothing in the specification indicating that knowledge of the exact flow rate, beyond consideration of whether it hits a certain threshold, is necessary or an integral part of the claimed invention.

The Court concludes that, interpreted in this way, claims 1, 11, and 21 of the '580 patent are not indefinite for requiring detection of a "flow rate." The accurate test for indefiniteness is not, as Nabors posits, whether the patent claims can be "practiced as expressly written," ECF No. 91 at 22, but rather whether a POSITA would know the scope of the claimed invention with reasonable certainty. In that regard, Nabors has failed to carry by clear and convincing evidence its burden of showing that the claims are indefinite. Nabors provides no expert opinion that a POSITA would not understand the scope of claim 21 with reasonable certainty, and as for claims 1 and 11, Nabors's expert, Dr. John Rodgers, agrees that a measure of standpipe pressure "could be used to provide a binary indication of mud flow as a simple 'flow' or 'no flow' indicator as described using a circulation threshold," but contends that a POSITA would not understand this comparison to be a detection of the flow rate of drilling mud, rendering the claims indefinite. *See* ECF No. 91-1 ("Rodgers Dec.") ¶¶ 18–20. However, as discussed, the Court has determined that the claim language, read in context of the full claim and the specification, describes the scope of the claimed invention with reasonable certainty. The Court further concludes that Nabors's proposed alternative construction improperly narrows the scope of the claims; as discussed, the claims do not require "calculation" of flow rate.

Accordingly, claims 1, 11, and 21 are not indefinite, and the Court construes each of these disputed terms to have its plain and ordinary meaning.

4. "Drift information" terms

Disputed Term	H&P's Proposed Construction	Nabors's Proposed Construction	The Court's Construction
"drift information" • '022 patent, cl. 15 • '506 patent, cl. 3	Ordinary meaning	Indefinite (35 U.S.C. § 112, ¶ 2); alternatively, Utilizing data about the Earth's formation to calculate the drift, i.e., the movement out of alignment, off center, or off course.	Ordinary meaning

a. The Parties' Positions

Nabors contends that "drift information" is indefinite because "there is no way to know what 'drift information' is and how it can be part of the drill plan." ECF No. 91, at 24. In addition, Nabors contends that claim 3 of the '506 patent is indefinite as an improper hybrid apparatus/method claim, because it requires the apparatus in claim 1 to "receive" drill plan information. In the alternative, Nabors argues that drift is a geological phenomenon, and thus "drift information" must be construed to consist of "data about the Earth's formation." Nabors further posits that "drift information" implicitly requires a calculation or measurement, pointing to the dictionary definition of "function" and a description in the '283 patent describing drift as a "function of drilling rate and BHA." *Id.* at 25 (quoting '283 patent, at 28:59–63).

H&P responds first that Nabors provides no expert testimony as to the '506 patent and whether a POSITA would have been reasonably certain of the scope of "drift information" as it appears in claim 3 of the '506 patent. Moreover, H&P contends "drift" has a known meaning in

the prior art, such that a POSITA would understand it to refer to "the movement off course due to an external influence, including the rock formation being drilled through (e.g., deviation tendencies caused by formation dips, faults, bedding planes, etc., acting on the drill bit)." ECF No. 23, at 23 (citing Hilbert Dec. ¶¶ 75, 100). For support, H&P points to the declaration of Nabors's expert, who opines, when discussing the '283 patent, that "[a] POSITA would understand that the formation can have an effect on the drift of the drill bit during drilling," thus indicating that "drift" has a known meaning and scope to a POSITA at least by the priority date of the '283 patent, and by extension the '022 and '506 patents, which have later priority dates than the '283 patent. *See* Rodgers Dec. ¶ 14.

b. The Court's Construction

Nabors has not carried its burden of establishing that Claim 15 of the '022 patent and claim 3 of the '506 patent are indefinite because of their reference to "drift information." Claim 15 of the '022 patent depends on dependent claim 14, which in turn depends on independent claim 13; claim 15 recites:

> The method of claim 14, wherein the drill plan information comprises at least one of the well plan, seismic data, data defining the target path, BHA location, BHA trajectory, BHA ROP and drift information.

'022 patent, cl. 15 (emphasis added).

Similarly, claim 3 of the '506 patent depends on independent claim 1, and recites:

> The drilling system according to claim 1, wherein the processor receives drill plan information comprising of at least one of a well plan, seismic data, data defining the target path, BHA location, BHA trajectory, BHA ROP, and drift information.

'506 patent, cl. 3 (emphasis added).

For both disputed claims, the relevant "drift information" term appears in the context of drill plan information. The specification describes drilling plan information as follows:

> [D]rilling plan information is obtained for convergence solution calculations if it has not already been obtained. The drilling plan information may be a well plan,

> seismic data, and/or any other information that defines the target path **104** that the BHA **220** is to follow. Current BHA information such as location, trajectory, ROP, and other information may also be obtained so that a convergence plan can be calculated to realign the BHA with the target path **104**. Other information, such as drift information, may be obtained if not included in the drilling plan information for use in sliding and/or rotation calculations.

'022 patent, at 6:51–61 (emphasis added); '506 patent, at 6:46–56.

The specification describes drift in the context of "geological drift":

> Due to geological factors such as drift, drilling a path as a straight line may not actually result in a straight line because rotational drilling has a tendency to curve due to drift. When formulating and reviewing plans, the geological drift may be accounted for by drilling somewhat off course relative to a straight line path and/or by planning corrective slides. . . . Furthermore, a path may use geological drift (if present in the formation) to account for sliding time and other corrective measures (e.g., may allow the drift to correct the course instead of performing a slide).

'022 patent, at 8:3–15; '506 patent, at 7:65–8:9.

As read in the context of the specification and the agreement between the parties' experts that "drift" is a term that is known and understood by a POSITA, the Court finds that a POSITA would have reasonable certainty about the scope of "drift information" as it appears in the claims. As explained in the portions quoted above, the specification states that a drilling plan may be formulated to account for drift—whether by intentionally drilling off course and planning corrective slides, or allowing drift itself to correct the course. Such information may be included in drilling plan information, or may be otherwise obtained for use in sliding and/or rotation calculations. The law does not require that, so as to not be found indefinite, a patent disclosure provide the amount of detail demanded by Nabors; instead, the standard "mandates clarity, while recognizing that absolute precision is unattainable." *Nautilus*, 572 U.S. at 899.

Nor is claim 3 of the '506 patent an improper hybrid apparatus/method claim. Claim 3 describes a processor that "receives" drill plan information; this claim language merely describes

the capabilities of the claimed apparatus, not a separate method step, and accordingly is not improper. *See Ultimate Pointer*, 816 F.3d at 826.

Finally, the Court finds no support in the specification for Nabors's proposed alternative construction. As an initial matter, Nabors does not explain why "drift information," a noun, should be construed as an activity, "utilizing data about the Earth's formation to calculate the drift." Nor is there any suggestion in the specification that "drift information" requires a calculation; by its plain terms, "drift information" is information about drift, and neither expressly nor impliedly requires calculations to measure drift. In sum, the Court concludes that Nabors has not shown that a construction for "drift information" is necessary, and accordingly, the Court construes it to have its ordinary meaning, as understood by a POSITA.

5. '283 patent, claim 15: "calculating . . . a cost of each of the plurality of solutions"

Disputed Term	H&P's Proposed Construction	Nabors's Proposed Construction	The Court's Construction
"calculating . . . a cost of each of the plurality of solutions" • '283 patent, cl. 15	Ordinary meaning	Indefinite (35 U.S.C. § 112, ¶ 2); alternatively, calculating the financial costs in dollars ($) and cents (¢) for each of the plurality of solutions (defined above (No.1))	Ordinary meaning

a. The Parties' Positions

Nabors challenges claim 15 of the '283 patent as indefinite because it is directed to "calculating . . . a cost," yet the specification describes calculating cost in various different ways that could potentially yield different results. Nabors relies on the Federal Circuit's decision in *Teva Pharms. USA, Inc. v. Sandoz, Inc.*, 789 F.3d 1335 (Fed. Cir. 2015), which held that a claim

reciting "molecular weight" was indefinite because the parties failed to specify which method of calculating molecular weight should be used, where each method provided a different result and could impact whether a polymer fell within the claimed scope. Nabors alternatively contends that if this term is not found to be indefinite, "cost" should be construed as limited to a monetary cost expressed in dollars and cents.

H&P responds that *Teva* does not apply here because the claims at issue do not require measurement of a particular value or dictate a range for that value, and thus the fact that a cost may be calculated in different ways does not impact infringement. H&P further contends that limiting cost to financial cost improperly limits the scope of claim 15.

b. The Court's Construction

The Court concludes that *Teva* is distinguishable, and does not control here. In *Teva*, the relevant claim recited a method of manufacturing copolymer-1, "to result in copolymer-1 having a molecular weight of about 5 to 9 kilodaltons." 789 F.3d at 1338 (emphasis omitted). It was undisputed that "molecular weight" has no known meaning in the art, that there are at least three different methods of calculating molecular weight, and that each of them could result in a different result. *Id.* at 1341–45. Neither the claims nor the specification defined molecular weight or provided guidance on which method to use. Accordingly, because the choice of method would impact the calculated molecular weight and, by extension, whether a given polymer infringed, the Federal Circuit concluded that the claim was indefinite, because it failed to inform a POSITA, with reasonable certainty, about the scope of the invention. *Id.*

In contrast, Nabors has not shown that calculating "cost' in different manners affects whether claim 15 of the '283 patent is infringed. Claim 15 recites a method for drilling a borehole comprising, *inter alia*, calculating a plurality of solutions for the drill bit to return to the planned path, and then "calculating, by the surface steerable system, a cost of each of the

plurality of solutions," and "selecting, by the surface steerable system, a first solution from the plurality of solutions based at least partly on the cost of the first solution." '283 patent, cl. 15. By its plain language, claim 15 does not require anything beyond the fact that each solution's cost is calculated, and that selecting a solution is based at least partly on cost; to perform the patented method, claim 15 does not mandate that the calculated cost be in any particular format or fall into some predetermined range. Put differently, unlike in *Teva*, Nabors has not shown that calculating cost one way will render an embodiment within the scope of the claims, whereas calculating it a different way makes it outside the claims. The Court does not read *Teva* as creating a rigid rule that a claim requiring a calculation must always specify only one method of performing that calculation lest the claim be indefinite.

Given that claim 15 requires only that a cost be calculated, and is agnostic as to the method of calculation, the particular method of calculating the cost of a solution has no impact on whether the claim is infringed. Nabors provides no other reason why this claim is indefinite, and accordingly, has not carried its burden in showing that a POSITA would not know the scope of the claimed method with reasonable certainty.

In addition, Nabors's alternative proposed construction improperly limits the "cost" calculation in claim 15 to a financial cost expressed in dollars and cents. Nabors's proposed construction is contrary to both the claim language and the specification. The Court notes claim 15's use of the indefinite article "a"—"a cost" as opposed to "the cost"—which indicates the potential for more than one type of cost for consideration. *See Baldwin Graphic Sys., Inc. v. Siebert, Inc.*, 512 F.3d 1338, 1342 (Fed. Cir. 2008) ("That 'a' or 'an' can mean 'one or more' is best described as a rule, rather than merely as a presumption or even a convention."). The specification likewise confirms that cost "may represent a financial value, a reliability value, a

time value, and/or other values that may be defined for a convergence path." '283 patent, at 18:47–50.

Moreover, reading claim 15 in context with other claims in the '283 patent reveals that "a cost," without any modifiers, is not limited to financial cost. *See Phillips*, 415 F.3d at 1314–15 ("Differences among claims can also be a useful guide in understanding the meaning of particular claim terms."). Claim 1, for example, uses the phrase "financial cost parameters" to specify when the cost in question is financial in nature. '283 patent, cl. 1 ("a set of financial cost parameters"). Claim 18, which depends on claim 16, which itself depends on claim 15, further specifies that "one of the plurality of cost elements is time and another of the plurality of cost elements is a financial cost." *Id.* at cl. 18. If "cost" in independent claim 15 refers solely to a financial cost, the reference to time costs and financial costs in claim 18 is both inconsistent and redundant. *See Ortho-McNeil Pharm. v. Mylan Lab'ys, Inc.*, 520 F.3d 1358, 1362 (Fed. Cir. 2008) ("[T]his court strives to reach a claim construction that does not render claim language in dependent claims meaningless."); *Wright Med. Tech., Inc. v. Osteonics Corp.*, 122 F.3d 1440, 1445 (Fed. Cir. 1997) ("[W]e must not interpret an independent claim in a way that is inconsistent with a claim which depends from it.").

Nor does the Court find persuasive Nabors's argument that the specification and prosecution history dictates that a cost—whether referring to time, reliability, or some other value—must always be expressed in terms of dollars and cents. Nabors cites to excerpts from the specification and the prosecution history of the '022 and '506 patents—which are unrelated to the '283 patent—for support that the relevant costs must be capable of being combined into a total monetary cost. ECF No. 91, at 29 n.55. However, the specification of the only relevant patent for purposes of construing this claim term, the '283 patent, does not mandate that all costs

be normalized into a single unit of measurement, either expressly or by implication, and Nabors points to nothing in the prosecution history of the '283 patent to indicate that the patentee disclaimed costs being expressed in ways other than dollars and cents. *See Kara Tech. Inc. v. Stamps.com Inc.*, 582 F.3d 1341, 1348 (Fed. Cir. 2009) ("The patentee is entitled to the full scope of his claims . . . .").

For the foregoing reasons, the Court concludes that a POSITA would understand the scope of "calculating . . . a cost of each of the plurality of solutions" in claim 15 of the '283 patent with reasonable certainty, and that this term should be construed according to its ordinary meaning.

B. Other Disputed Terms

1. "Solutions" and "Path" terms

Disputed Term	H&P's Proposed Construction	Nabors's Proposed Construction	The Court's Construction
"calculating . . . a plurality of solutions" • '283 patent, cl. 15[2]	Ordinary meaning	calculating/identifying at least two or more solutions, *i.e.*, paths	Ordinary meaning, where "plurality" means "two or more"
"identifying . . . a plurality of geometric convergence paths" • '022 patent, cl. 1	Ordinary meaning	calculating/identifying at least two or more solutions, *i.e.*, paths	Ordinary meaning, where "plurality" means "two or more"
"plurality of convergence paths" • '022 patent, cl. 13	Ordinary meaning	calculating/identifying at least two or more solutions, *i.e.*, paths	Ordinary meaning, where "plurality" means "two or more"
"identifying a plurality of convergence paths" • '506 patent, cl. 1	Ordinary meaning	calculating/identifying at least two or more solutions, *i.e.*, paths	Ordinary meaning, where "plurality" means "two or more"

[2] Nabors initially proposed a construction for an additional term in claim 15 of the '283 patent, "wherein each of the plurality of solutions defines a path from the estimated position to the planned path," but in its responsive claim construction brief, stated that it was withdrawing its proposed construction for that particular term. ECF No. 91 at 21 n.62. Accordingly, in the absence of a dispute regarding claim interpretation, the Court does not construe this term "wherein each of the plurality of solutions defines a path from the estimated position to the planned path" in claim 15 of the '283 patent.

a. The Parties' Positions

For these four terms in the '283, '022, and '506 patents, Nabors presents two disputes for resolution: first, the meaning of "calculating" versus "identifying," and second, the meaning of "solutions," "convergence paths," and "geometric convergence paths." Regarding the first dispute, Nabors contends that "calculating" and "identifying" must be construed consistently, relying on the fact that the specifications of the '022 and '506 patents incorporate by reference the specification of a continuation-in-part of the application which became the '283 patent, as an example of one method for convergence path calculations. *See, e.g.*, '022 patent, at 2:59–65 ("One possible method for such convergence path calculations is disclosed in U.S. application Ser. No. 13/530,298 . . . which is hereby incorporated by reference in its entirety."). Because the specifications of the '022 and '506 patents do not describe convergence paths being "identified," and instead only "calculated," Nabors contends that the only reasonable interpretation of the "identifying" steps in the '022 and '506 patents is to construe them consistently with the "calculating" step of the '283 patent. Regarding the second dispute, Nabors similarly contends that the '283, '022, and '506 patents use the terms "solutions" and "paths" interchangeably to refer to the path(s) from the estimated bit position to the planned path of the borehole, and accordingly, should be construed consistently. The parties agree that the ordinary meaning of "plurality" is "two or more."

H&P responds that Nabors's proposed constructions improperly rewrite the claim language by conflating different terms, which are presumed to have different meanings. In addition, as to the "calculating" versus "identifying" dispute, H&P contends that Nabors's proposal conflicts with dependent claims in the '022 and '506 patents, which describe ways of identifying a plurality of convergence paths that do not involve calculations. As to the second

dispute, H&P contends that Nabors's construction is redundant for claim 15 of the '283 patent, and improper for the '022 and '506 patents, which do not use the word "solutions" in the claims.

b. The Court's Construction

As to the first dispute, the Court finds Nabors's proposed construction improperly conflates "calculating" and "identifying," which convey different meanings. "In the absence of any evidence to the contrary, we must presume that the use of these different terms in the claims connotes different meanings." *CAE Screenplates Inc. v. Heinrich Fiedler GmbH & Co. KG*, 224 F.3d 1308, 1317 (Fed. Cir. 2000). The fact that the '022 and '506 patents incorporate the '283 patent by reference does not alone render all references to "identifying" convergence paths therein synonymous with the '283 patent's disclosed method of "calculating" solutions. In addition, Nabors's proposed construction of "calculating/identifying" is itself confusing; it is not immediately apparent whether the construction is intended to be both calculating *and* identifying, or calculating *or* identifying, or as Nabors appears to argue, that calculating and identifying both mean "calculating."

Moreover, the specifications of the '022 and '506 patents indicate that although the terms may be similar, there exists a distinction between "calculating" and "identifying" a convergence path. For example, "[a]lthough not discussed in detail herein, the calculation of the convergence paths themselves may use any of a number of processes," including the method disclosed in the '283 patent, which is incorporated by reference. '022 patent, at 2:59–65. "Identifying" a convergence path is described in more detail, and involves potentially eliminating illogical paths, as well as using parameters to narrow the pool of potential path options. *E.g.*, '022 patent, at 6:8–42; *see also id.* at 34–37 ("For example, as described previously, parameters may be used in step **304** to constrain the identification of the geometric convergence paths."). This interpretation is supported by the claims; both the '022 and '506 patents contain dependent

claims that describe "identifying" convergence paths through methods that do not involve calculations or mathematical methods, such as by removing paths that are illogical or are responsive to certain well plan information. *E.g.*, '022 patent, claim 5 ("The method of claim 2, wherein the step of identifying further comprises the steps of removing some of the plurality of convergence paths to remove illogical convergence paths."); '506 patent, claim 2 ("The drilling system according to claim 1, wherein the processor of the computer system receives drill plan information . . . and identifies the plurality of convergence paths responsive to the drill plan information."). Nabors's proposed construction, which conflates "identifying" with performing a mathematical calculation, is inconsistent with these dependent claims. *See Baxalta Inc. v. Genentech, Inc*., 972 F.3d 1341, 1346 (Fed. Cir. 2020) (rejecting "construction which renders dependent claims invalid"); *Intell. Ventures I LLC v. T-Mobile USA, Inc*., 902 F.3d 1372, 1378 (Fed. Cir. 2018) (construction that renders dependent claims meaningless is "disfavored").

As to the second dispute, Nabors's proposed construction conflates the '283 patent with the '022 and '506 patents, despite it being in a different family, and needlessly seeks to impose a uniform construction across terms that disregards the unique claim language and is unsupported by the specifications. Regarding the '283 patent, claim 15 recites "calculating . . . a plurality of solutions . . . wherein each of the plurality of solutions defines a path from the estimated position to the planned path"; given that claim 15 already expressly provides that each solution "defines a path," it is both redundant and inaccurate to construe this claim to mean "solutions, *i.e*., paths." In contrast, the word "solution" does not appear in any claims of the '506 patent, and appears in a slightly different context in relevant claims of the '022 patent. *See, e.g.*, '022 patent, cl. 1 ("each of the geometric convergence paths provides a convergence solution"); *see id.* at cl. 13 (same). Put differently, in the '283 patent, the "solution" defines a "path," whereas in the '022

patent, the "path" provides a "solution." Given that these patents are not in the same family, the Court declines to disregard the patentee's choice of language and construe these terms interchangeably. Accordingly, the Court rejects Nabors's proposed constructions for these terms, and construes them according to their ordinary meaning, where "plurality" means "two or more."

2. "Slide estimator . . . detects a slide mode" terms

Disputed Term	H&P's Proposed Construction	Nabors's Proposed Construction	The Court's Construction
"the slide estimator detects a slide mode responsive to detection of a flow rate of drilling mud, a stationary BHA and an on bottom condition of the BHA" • '580 patent, cl. 1	Ordinary meaning	The system detects whether the drilling mode is in (A) slide mode or (B) rotary mode of operation based upon (1) flow rate of the drilling mud; (2) a stationary BHA (bottom hole assembly); and (3) an on bottom condition of the BHA.	Ordinary meaning
"the step of detecting further comprises detecting a flow rate of a drilling mud, a stationary BHA and an on bottom condition of the BHA" • '580 patent, cl. 11	Ordinary meaning	The system detects whether the drilling mode is in (A) slide mode or (B) rotary mode of operation based upon (1) flow rate of the drilling mud; (2) a stationary BHA (bottom hole assembly); and (3) an on bottom condition of the BHA.	Ordinary meaning
"detecting a flow rate of drilling mud, a stationary BHA and an on bottom condition of the BHA to determine whether the BHA is in the slide mode or the rotary mode of operation" • '580 patent, cl. 21	Ordinary meaning	The system detects whether the drilling mode is in (A) slide mode or (B) rotary mode of operation based upon (1) flow rate of the drilling mud; (2) a stationary BHA (bottom hole assembly); and (3) an on bottom condition of the BHA.	Ordinary meaning

c. The Parties' Positions

Nabors contends that this language from claims 1, 11, and 21 of the '580 patent should be construed consistently to reflect that the claimed system detects whether the drilling mode is in slide or rotary mode, based upon flow rate of the drilling mud, a stationary BHA, and an on bottom condition of the BHA. H&P responds that Nabors's proposal improperly forces a "one size fits all" construction onto three separate claims with different language, and in doing so, adds narrowing limitations. Specifically, H&P contends that Nabors's proposed construction improperly replaces the slide estimator with "the system"; requires the drilling mode detection be "based upon," as opposed to "responsive to" specified information; and compels consideration of three parameters—flow rate, a stationary BHA, and an on bottom condition—in determining a slide or rotary mode of operation. H&P further points out that the parties do not dispute that the slide modes and rotary modes of drilling are mutually exclusive, and thus Nabors's proposal that the construction expressly specify that slide mode or rotary mode is being detected does not add to the understanding of the claim language.

d. The Court's Construction

The Court concludes that these terms should be construed according to their ordinary meaning. Nabors provides no justification for several aspects of its proposed construction that depart from claim language and, in the Court's view, add ambiguity. For example, claim 1 recites an apparatus comprising "a slide estimator of a surface steerable system . . . wherein the slide estimator can detect" the slide operation. *See* '580 patent, cl. 1. Nabors's proposal inexplicably replaces the slide estimator with "the system" as being the component detecting the mode of drilling operation, suggesting that the steerable system itself is doing the detection, as opposed to the slide estimator within it. Similarly, Nabors does not explain why it replaces the phrase "responsive to" in claim 1 with "based upon" in its proposed construction; to the extent

Nabors claims these terms have the same meaning, the Court declines to adopt a construction that unnecessarily incorporates language not in the claims. In general, the Court finds that Nabors's proposed construction provides no greater clarity or understanding that could not be discerned from simply reading the claims themselves.

On the whole, the Court is skeptical of the utility in construing these three claims consistently when the claims contain manifestly different language and are not ambiguous in scope. The sole dispute identified by Nabors potentially justifying its proposed construction is its contention that each claim requires that determining slide or rotary mode requires detection of each of a flow rate of drilling mud, a stationary BHA, and an on bottom condition of the BHA. However, while the claims each recite detection of these three parameters, Nabors's proposed uniform construction overly simplifies how these parameters appear in each claim. In claim 1, the slide estimator detects whether the BHA is in slide more or rotary mode "responsive to the externally monitored data," and in claims 11 and 21, detecting slide or rotary mode is responsive to "the monitored at least one well sensor parameter" and "the monitored plurality of well sensor parameters," respectively. Nabors argues that these "externally monitored data" and "well sensor parameter[s]" correspond to the three parameters recited in its proposed construction, and thus determination of a slide or rotary mode of operation must be based on all three of these parameters. ECF No. 91, at 38.

This position is not supported by the language of claims 1, 11 and 21, so as to justify a uniform construction across all three claims. Only claim 21 makes clear that determining the slide or rotary mode requires detection of these three parameters. *See* '580 patent, cl. 21 ("the step of detecting further comprises: detecting a flow rate of drilling mud, a stationary BHA and an on bottom condition of the BHA to determine whether the BHA is in the slide mode or the

rotary mode of operation"). In contrast, the other claims each require only that detecting slide or rotary mode be responsive to either "externally monitored data" (claim 1) or "at least one well sensor parameter" (claim 11). Thus, although the claimed detecting steps comprise detecting the three parameters, the Court is not convinced that the claims also require that the *determination* of the operation being in slide or rotary mode be based on those three parameters. For example, claim 1 only requires that the "slide estimator detects a *slide mode* responsive to" a flow rate, stationary BHA, and an on bottom condition; the slide estimator could detect a rotary mode of operation based on some other externally monitored data; for example, where there is torque being applied to the entire drill string via a topdrive or rotary table. Claim 21 demonstrates that the patentee knew how to claim when the slide/rotary determination was based on an evaluation of all three parameters, and the patentee's decision to use different language in claims 1 and 11 cannot be disregarded.

In sum, the Court finds no support for Nabors's proposed construction. Claims 1, 11, and 12, are construed to have their ordinary meanings.

IV. CONCLUSION

The Court adopts the constructions set forth above, as summarized in the following table. The parties are **ORDERED** not to refer, directly or indirectly, to each other's claim construction positions in the presence of the jury. Likewise, the parties are **ORDERED** to refrain from mentioning any portion of this opinion, other than the actual definitions adopted by the Court, in the presence of the jury. Any reference to claim construction proceedings is limited to informing the jury of the definitions adopted by the Court.

Term	Construction
"drilling, by the drilling rig, at least a portion of the borehole based on the control information." • '283 patent, cl. 15	Ordinary meaning

"controlling the drilling system to drill in accordance with the selected convergence path." • '506 patent: cl. 1	Ordinary meaning
"controlling the operation of the drilling rig responsive to the detected slide mode or rotary mode of operation" • '580 patent, cls. 11, 21	Ordinary meaning
"identifies a plurality of convergence paths responsive to the drill plan information" • '506 patent, cl. 2	Ordinary meaning
"wherein the detection of the flow rate of drilling mud is determined by detection of a standpipe pressure exceeding a standpipe pressure circulation threshold" • '580 patent, claim 1	Ordinary meaning
"wherein the step of detecting the flow rate further comprises determining whether a standpipe pressure exceeds a standpipe pressure circulation threshold" • '580 patent, claim 11	Ordinary meaning
"wherein the step of detecting the flow rate of drilling mud further comprises determining if the flow rate of the drilling mud exceeds a predetermined flow circulation threshold" • '580 patent, claim 21	Ordinary meaning
"drift information" • '022 patent, cl. 15 • '506 patent, cl. 3	Ordinary meaning
"calculating . . . a cost of each of the plurality of solutions" • '283 patent, cl. 15	Ordinary meaning
"calculating . . . a plurality of solutions" • '283 patent, cl. 15	Ordinary meaning, where "plurality" means "two or more"
"identifying … a plurality of geometric convergence paths" • '022 patent, cl. 1	Ordinary meaning, where "plurality" means "two or more"
"plurality of convergence paths" • '022 patent, cl. 13	Ordinary meaning, where "plurality" means "two or more"
"identifying a plurality of convergence paths" • '506 patent, cl. 1	Ordinary meaning, where "plurality" means "two or more"
"the slide estimator detects a slide mode responsive to detection of a flow rate of drilling mud, a stationary BHA and an on bottom condition of the BHA" • '580 patent, cl. 1	Ordinary meaning
"the step of detecting further comprises detecting a flow rate of a drilling mud, a stationary BHA and an on bottom condition of the BHA"	Ordinary meaning

• ’580 patent, cl. 11	
“detecting a flow rate of drilling mud, a stationary BHA and an on bottom condition of the BHA to determine whether the BHA is in the slide mode or the rotary mode of operation” • ’580 patent, cl. 21	Ordinary meaning

SO ORDERED.

August 17, 2022.

BARBARA M. G. LYNN
CHIEF JUDGE